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A LETTER

TO

THE RIGHT REVEREND

THE LORD BISHOP OF DURHAM.

CONTAINING

SOME OBSERVATIONS

ON THE

CLIMATE OF RUSSIA,

AND THE

NORTHERN COUNTRIES.

WITH

A VIEW OF THE FLYING MOUNTAINS AT ZARSKO SELLO NEAR ST. PETERSBOURG.

FROM

JOHN GLEN KING, D.D. F.R.S. and A.S.

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LETTER

TO

THE RIGHT REVEREND

THE LORD BISHOP OF DURHAM, &c.

MY LORD,

I TAKE the liberty to ſend your Lordſhip a few remarks I made, during my reſidence in Ruſſia, on the cold in that country; particularly, with reſpect to the means by which the inhabitants of thoſe northern climates are enabled not only to protect themſelves from ſuffering by its inclemency; but to turn it to their advantage, and even to enjoy amuſements peculiar to it. Which will juſtify

the obſervation of our excellent philoſophical poet, who ſays,

" What happier natures ſhrink at with affright,
" The hard inhabitant contends is right."

ESSAY ON MAN.

O T

If I could have communicated any experiments which might have helped to diſcover the natural cauſe of *freezing*, and have ſerved either to confirm ſome of the ſeveral theories already given of this phænomenon, or to eſtabliſh a new one; I ſhould have thought my remarks more worthy your Lordſhip's attention, and have long ſince put the looſe notes, which have lain by me, on this ſubject, into ſome form. But though I made many experiments in freezing ſeveral ſubſtances, I cannot pretend to have found any thing new or ſingular to remark as to the nature of congelation. Yet ſtill, I hope it may afford your Lordſhip ſome amuſement to obſerve the ſagacity and addreſs, which the human mind exerts, in the application of the proper means of ſelf-preſervation: and the conſideration of the wonderful proviſion which the wiſdom and goodneſs of Divine Providence has ſuited to the

the peculiar wants of his creatures, I am ſure, your Lordſhip will always look upon as the moſt intereſting part of natural hiſtory.

It is neceſſary for me to premiſe, that in the courſe of theſe obſervations I may be obliged to repeat ſeveral things which have been ſaid before; but, I flatter myſelf, I may be able to ſet ſome of them in a new light, and to add others which have been overlooked or omitted.

I muſt firſt obſerve to your Lordſhip, that the cold in St. Peterſbourg, by Farenheit's ſcale, is, during the months of December, January, and February, uſually from 8 to 15 or 20 degrees below 0; that is, from 40 to 52 degrees below freezing point: though commonly, in the courſe of the winter, it is for a week or ten days ſome degrees lower.

It is almoſt difficult for an inhabitant of our temperate climate to have any idea of a cold ſo great; it may, perhaps, help to give ſome notion of it, to tell you that when a perſon walks out in that ſevere weather, the cold makes the eyes water,

and

and that water freezing hangs in little icicles on the eye-laſhes. As the common peaſants uſually wear their beards, you may ſee them hanging at the chin like a ſolid lump of ice. Yet, by the way, the advantage of the beard, even in that ſtate, to protect the glands of the throat, is worth obſervation: and the ſoldiers, who do not wear their beards, are obliged to tie a handkerchief under the chin to ſupply their place. From this account, it may eaſily be imagined, that the parts of the face, which are expoſed, are very liable to be frozen; and it may ſeem ſtrange, what is a certain fact, and has been often obſerved, that the party himſelf does not know when the freezing begins; but is commonly told of it firſt by ſomebody who meets him, and calls out to him to rub his face with ſnow, the uſual way to thaw it. It is alſo remarkable that the part, which has once been frozen, is ever after moſt liable to be frozen again.

In ſome very ſevere winters, I have ſeen ſparrows, though a hardy bird, quite numbed by the intenſe cold, and unable to fly. And I have heard that the drivers, who ſit on their loaded carriages, have ſometimes been found frozen to death in that poſture.

poſture. The ſeaſons however are ſeldom ſo ſevere, and that ſeverity laſts but a few days; though it is not unfrequent, in the courſe of a winter, that ſome poor wretches, getting drunk with ſpirituous liquors, fall down by the road-ſide, and periſh by the cold before any one finds them. I dare ſay, your Lordſhip begins to ſhiver at this relation; but I will ſoon carry you into one of the houſes of the country, where I will promiſe you, you will find it ſufficiently warm: yet I will firſt beg leave to mention a few experiments with regard to freezing ſubſtances, ſome of which I made myſelf, and others I have had well authenticated.

When the thermometer has ſtood at 25 degrees below 0, boiling water thrown up into the air by an engine, ſo as to ſpread, falls down perfectly dry, formed into ice. I have made an experiment nearly like this, by throwing the water out of a window two pair of ſtairs high. A pint bottle of common water, I have found frozen into a ſolid piece of ice in an hour and a quarter. During the operation, I have obſerved the *ſpicula* flying towards the exterior part of the water, full an inch, or an

inch and half long, where they form the chryſtallization; the great length of theſe ſpicula is remarkable, and ſeems to be cauſed by the intenſeneſs of the cold. A bottle of ſtrong ale has been frozen in an hour and half; but in this ſubſtance there is always about a tea-cup full in the middle unfrozen, which is as ſtrong and inflammable as brandy or ſpirits of wine. I never ſaw good brandy or rum freeze to ſolid ice, though I have ſeen ice very thin in both, when put in a ſmall flat phial: the phials, I made uſe of for the experiment, were the common bottles in which there had been lavender water.

It may not be foreign to theſe inſtances to mention an experiment made by Prince Orloff, maſter of the Ordnance to her imperial Majeſty, which I had from him, though I was not a witneſs of it myſelf. He filled a bomb-ſhell with water, and then ſtopped up the hole very cloſely with a plug; and, as ſoon as the congelation began, the contents of the ſhell ſwelling iſſued out by the ſide of the plug, like a ſmall *jet d'eau*, or fountain. He then made a ſcrew to faſten up the hole of the bomb-ſhell, after it was filled with water; and in twenty minutes the

froſt

froſt burſt the ſhell with ſome degree of violence, ſo that ſome of the pieces flew to the diſtance of four or five yards.

Severe, however, as the cold in this climate is, it is ſeldom any body ſuffers from it, ſo eaſy are the means and ſo plentiful are the proviſions to guard againſt it; beſides the inconveniences of the exceſs of cold are much leſs than thoſe of the oppoſite extreme, in countries ſubject to an exceſs of heat. Indeed, juſt in St. Peterſbourg, the poor ſometimes ſuffer; as in all capitals the hardſhips of the poor are greateſt; but, for others, they are ſo well protected, both without doors and within, that you ſeldom hear them complain of cold. It is well known that in Ruſſia the method of warming the houſes is by an oven conſtructed with ſeveral flues, and that the country abounds with wood, which is the common fuel; however, theſe ovens conſume a much ſmaller quantity of wood than could be imagined, and yet they ſerve at the ſame time for the ordinary people to prepare their food by. They put a very moderate faggot into them, and ſuffer it to burn only till the thickeſt black

ſmoak

ſmoak is evaporated; they then ſhut down the chimney to retain all the reſt of the heat in the chamber, which keeps its heat twenty-four hours, and is commonly ſo warm that they ſit with very little covering, eſpecially children, who are uſually in their ſhirts.

The windows in theſe huts are very ſmall, as it is obvious that part muſt be liable to be coldeſt; in the houſes of perſons of condition the windows are caulked up againſt winter, and commonly have double glaſs frames. In ſhort, they can regulate the warmth in their apartments by a thermometer with great exactneſs, opening or ſhutting the flues to increaſe or diminiſh the heat. In the ſevereſt weather a Ruſſian would think it ſtrange to ſit in a room where the cold condenſed his breath ſufficiently to render it viſible, as it commonly does in England in froſty weather; and ſurely it is agreeable to have the warmth equal in every part of the room. It might perhaps be thought that the air, in apartments ſo cloſe, muſt needs be very unfit for reſpiration; but the fact is full againſt the conjecture; for Peterſbourg is reckoned

reckoned as wholſome a place as any city in Europe; probably, the natural elaſticity of the air is ſo great, in all thoſe high latitudes, that it is not eaſily deſtroyed.

Thus the inhabitants ſuffer no hardſhips from the cold within doors; I will venture to aſſert not ſo much as the inhabitants of England, where the duration of ſevere cold is ſo ſhort, that it is hardly an object of attention to guard againſt it, either in their dwellings or their apparel. Whereas the Ruſſians, when they go out, are cloathed ſo warmly they bid defiance to froſt and ſnow; and it is obſervable, that the wind is never violent in the winter, and in general there is very little wind: but when it does happen to blow the cold is exceedingly piercing. The animals naturally require warm cloathing in theſe ſevere climates, man is therefore enabled readily to ſupply himſelf with covering from them: the wolf and the bear lend him their fur, as well as ſeveral other creatures; the fox, the ſquirrel, and the ermine: but none contribute ſo much to ſupply this want as the hare and the ſheep. With regard to the hare one muſt not omit to remark, that the better to conceal ſo timorous and weak an animal

from its enemies, Providence has wiſely ordered that in countries like theſe, which are covered with ſnow, the fur of this creature changes in the winter to white; it being in ſummer brown, the natural colour of the ground: and its fur is much longer, and conſequently warmer than in more ſouthern latitudes. The poorer women commonly line their cloaks with hare-ſkin; and the men for the moſt part have a dreſs made of ſheep's ſkin with the wool turned inwards. On their heads they wear a warm fur cap, and they are very careful to cover their legs and feet not only with warm ſtockings, but with boots lined with fur, or a quantity of flannel which they wrap ſeveral times round them. Yet, in the ſevereſt cold, you will ſee them go with their neck and breaſt quite open and expoſed. This ſeems a kind of natural inſtinct, the parts neareſt the heart, where the blood receives its firſt impulſe, being perhaps leſs liable to be injured by cold than the extremities of the body. Or does ſuch practice depend intirely upon cuſtom? For we ſee in our own country that cuſtom will do a great deal; at the ſame time that the men with us guard their breaſt with the warmeſt part of their dreſs, the moſt delicate lady expoſes her boſom

quite

quite uncovered; as well as her whole perſon in a garment ſo thin, that few men would think ſufficiently warm even in the mildeſt weather.

It muſt be confeſſed, the winters ſeem very long and tedious in theſe northern climates, the whole ſurface of the ground being covered with ſnow for ſix months or upwards; and the eye is, at leaſt my eye was, tired with the unvaried ſcene, *where Nature herſelf ſeems dead for half the year.* However, uſe makes even this much more tolerable to the natives, as well as their happy ignorance of better climes: and it is certain they enjoy many advantages which are peculiar to the nature of their ſituation.

The firſt advantage I ſhall mention is the facility of tranſport, and in conſequence expedition in travelling. Their carriages for the winter ſeaſon, it is well known, are ſledges, made with a frame at the bottom ſhod with iron like ſkates. The friction and reſiſtance are ſo ſmall on the ice and hard frozen ſnow, that when one pulls one of theſe machines, with a conſiderable load on it, on level

level ground, we ſeem ſurprized to find we can move it, with almoſt as much eaſe as we move a boat in ſtill water. The conſequence of this is a ready and cheap communication from one place to another; for a ſingle horſe will draw a great load in proportion to his ſtrength, and in parts diſtant from the capital, they do not keep any road with the ſledges, but make their way indifferently over rivers and bogs, and ſometimes I am told they travel by a compaſs. It may not perhaps be unworthy obſervation to remark that the roads over the rivers near Peterſbourg are ſet out by large boughs of fir trees planted on each ſide, forming an avenue; for the tracts of the carriages are very ſlight, and thoſe ſoon covered by drifted ſnow or a freſh fall. Near the capital, where the traffick is naturally the greateſt, the roads are kept in repair in winter with the ſame attention as in ſummer; when a thaw happens to injure them they are mended with freſh ice laid in the holes and covered with ſnow, and water thrown upon it to freeze again. Such precautions are neceſſary as theſe roads ſerve half the year: if the ice on the river be cracked, by a ſwell in the water, a bridge of planks is laid over it. It may be be added that the ſtrong northern light and the re-

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flection of the ſnow, generally afford a light ſufficient to travel by, when there is no moon.

It is obvious to imagine that with ſuch means wealth and luxury would find out very commodious methods of travelling. The late Empreſs Elizabeth had a ſledge, which I have ſeen, made with two complete little rooms in it, in one of which was a bed. I can believe the motion in ſuch a vehicle not to be greater than in a ſhip, when the ſea is tolerably ſmooth. The common travelling equipage, for perſons of condition, is made large enough to lie at length in, and when the bed or matraſs is rolled up it makes a ſeat to ſit upon. I need not take notice of the great expedition with which people travel, as it is ſo notorious; I mean with horſes, for I am unacquainted with thoſe parts where rein-deer are uſed. The accommodations on the road are, indeed, very poor; but travellers want them but little, as they uſually take their proviſions with them, and travel by night as well as by day.

Another advantage peculiar to the northern climates, is the preſerving proviſions by the froſt.

Froſt may certainly be looked up as the beſt pickle while it ſerves; that is, it alters the quality and taſte of whatever is preſerved by it leſs than any other. It is evident, the three common preſerves, ſugar, vinegar, and ſalt impart their reſpective taſtes ſo ſtrongly, that very few things ſo preſerved retain the leaſt of their natural flavour. Whereas froſt ſeems only to fix the parts and juices, and by that means to prevent fermentation. I ſhall mention a fact, in proof of this, which I had from my late worthy friend Mr. Swallowe, his Majeſty's Conſul General in Ruſſia. He aſſured me that having, one winter, occaſion to go from Peterſbourg to Moſcow, where eels are a great rarity, he ordered ſome to be taken before he ſat out on his journey to carry as a preſent; as ſoon as they were taken out of the water, they were thrown upon the ground to be frozen, they appeared quite dead and almoſt a piece of ice; they were then packed up in the uſual manner with ſnow; and when he arrived at Moſcow, which was in four days, the eels being thrown into cold water, and ſo thawed before they were dreſſed, diſcovered evident marks of life in them, and ſoon perfectly recovered. The inference

I would

I would draw from this fact is, that freezing does not dilacerate the parts. Veal frozen at Archangel and brought to Peterſbourg is eſteemed the fineſt they have; nor can it be diſtinguiſhed at the table from what is freſh killed, being equally juicy.

The markets in the capital are by this means ſupplied in winter with all manner of proviſions, at a cheaper rate than would otherwiſe be poſſible: and it is not one of the leaſt curious things to ſee the vaſt ſtacks of whole hogs, ſheep, fiſh, and other animals, piled up in the markets for ſale. Good houſewives, as ſoon as the froſt ſets in for the winter, about the end of October, kill their poultry, and keep them in tubs packed up with a layer of ſnow between them, as one would put ſalt to pickle pork or beef, and then take them out for uſe as occaſion requires: by this means they ſave the nouriſhment of the animal ſeveral months.

I hinted that the method of thawing any thing muſt be by immerging it in cold water: that operation effected by heat ſeems to occaſion a violent fermentation,

mentation, and almoſt a ſudden putrefaction: but when produced by cold water, the ice ſeems to be attracted out of the body, and forms a tranſparent incruſtation round it. This I have conſtantly ſeen round grapes, when thawed, which looked as if ſet in glaſs. Nay, I have thawed a bottle of water, when frozen to a ſolid piece of ice, by this means without breaking the bottle, and the ice has formed an incruſtation round it, in the manner I deſcribe. The ſame thing may be obſerved if a cabbage which is thoroughly frozen be thawed by cold water, it is as freſh as if juſt gathered out of the garden; but if it be thawed by fire or hot water, it becomes ſo rancid and ſtrong it cannot be eaten.

Theſe, my Lord, are ſolid advantages derived from the nature of the coldeſt climates. It might appear trifling after them to mention others of a leſs ſerious kind, and yet ſome of their amuſements are alſo peculiar to the climate. One of the chief is that of riding in a light open ſledge for pleaſure, which is very common, becauſe very agreable when the weather is not too ſevere. Skating may be mentioned as another; but the weather is often too

ſevere

ſevere for that, and therefore it is by no means ſo general in Ruſſia as in milder climates, ſuch as Holland, Germany, &c. But of all the winter diverſions of the Ruſſians the moſt favourite, and which is peculiar to them, ſeems to be that of ſliding down a hill. They make a track on the ſide of a ſteep hill, mending any little inequalities with ſnow or ice, then at the verge of the hill, ſitting on a little ſeat not bigger than, and much reſembling, a butcher's tray, they deſcend with aſtoniſhing velocity. The ſenſation is indeed very odd, but to myſelf, for I have often had the curioſity to try it, I cannot ſay it was agreeable; the motion is ſo rapid it takes away one's breath: nor can I give an idea of it, except deſiring you to fancy you were to fall from the top of a houſe without hurting yourſelf, in which you would probably have ſome mixture of fear and ſurprize. The Ruſſians are ſo fond of this diverſion, that at Peterſbourg, having no hills, they raiſe artificial mounts on the ice on the river Neva for the purpoſe of ſliding down them, particularly on holidays and feſtival ſeaſons, when all the people, young and old, rich and poor partake of the ſport; paying a trifle to the perſons who conſtructed the mount, each time they deſcend.

I call this peculiar to Ruſſia as a diverſion: for though it is practiſed at the place known by the name of the *Ramaſſe*, the deſcent of Mount Cenis to Lanebourg, which at ſome ſeaſons of the year is in a ſtate that admits of travellers ſliding down it in the ſame method, as is deſcribed in moſt books that treat of the Alps, yet this may be conſidered rather as neceſſity or convenience than merely amuſement.

The late Empreſs Elizabeth was ſo fond of this diverſion that, at her palace of ZARSKO SELLO, ſhe had artificial mounts, of a very ſingular conſtruction, made for this purpoſe, of which I here give your Lordſhip a plate. Theſe have been called, by ſome Engliſhmen who have viſited that country, *The Flying Mountains*, and I do not know a phraſe which approaches nearer to the Ruſſian name. You will obſerve that there are five mounts of unequal heights: the firſt and higheſt is full thirty feet perpendicular altitude; the momentum with which they deſcend this carries them over the ſecond, which is about five or ſix feet lower, juſt ſufficient to allow for the friction and reſiſtance; and

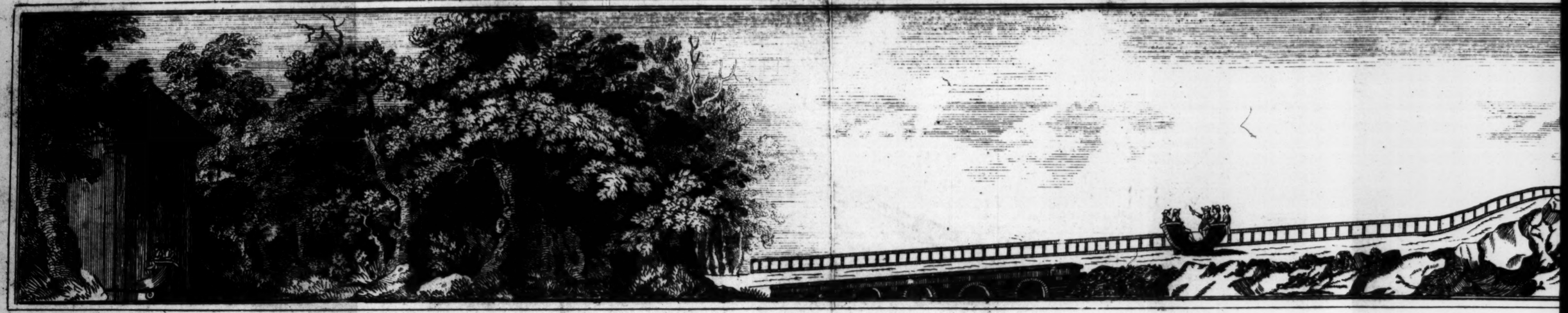
and ſo on to the laſt, from which they are conveyed by a gentle deſcent, with nearly the ſame velocity, over a piece of water into a little iſland. Theſe ſlides, which are about a furlong and half in length, are made of wood, that they may be uſed in ſummer as well as in winter. The proceſs is, two or four perſons ſit in a little carriage and one ſtands behind, for the more there are in it the greater the ſwiftneſs with which it goes; it runs on caſtors, and in grooves to keep it in its right direction, and it deſcends with a wonderful rapidity. Under the hill, is a machine worked by horſes for drawing the carriages back again, with the company in them. Such a work as this would have been enormous in moſt countries for the labour and expence it coſt, as well as the vaſt quantity of wood uſed in it. At the ſame place, there is another artificial mount which goes in a ſpiral line, and in my opinion, for I have tried it alſo, is very diſagreable; as it ſeems always leaning on one ſide, and the perſon feels in danger of falling out of his ſeat.

In winter no work can be done in agriculture, as may eaſily be imagined, the ground being faſtened

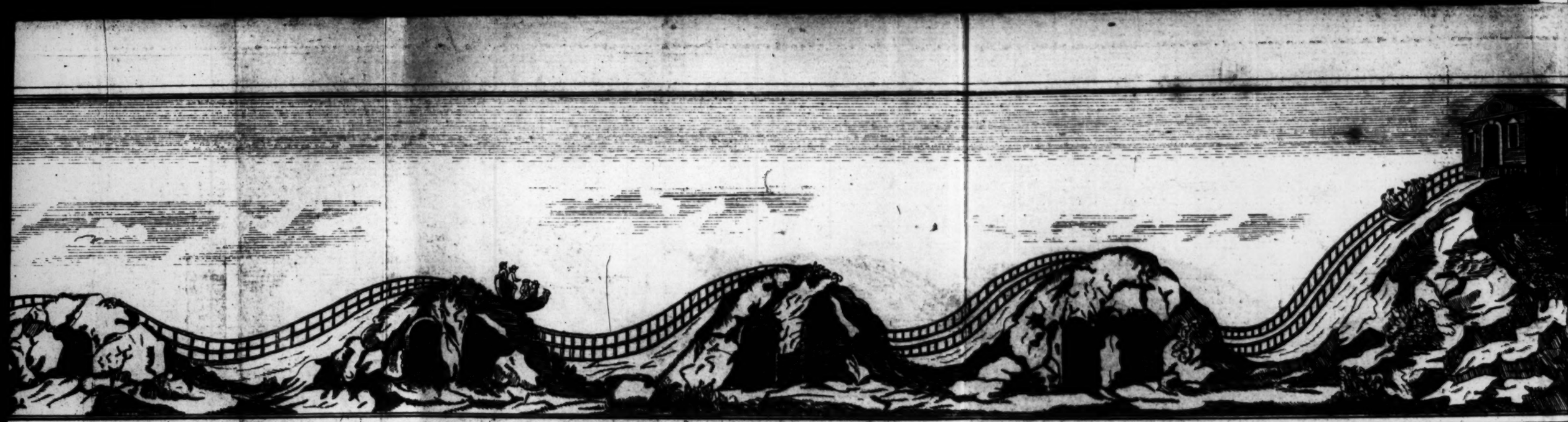
ened by the froſt as well as covered by ſnow. The œconomical buſineſs, therefore, which conſtitutes the employment of the common people in this ſeaſon, is, beſides the threſhing the corn, manufacturing their cloaths, for the peaſants in the villages make their own wearing apparel of every ſort, felling timber for building or other purpoſes, and cutting wood for fireing.

They are able alſo to go out a hunting, and as the country abounds with game it furniſhes a large part of their proviſions, during the ſeaſons when they are permitted to eat it; for the faſts of the Greek church taken together interdict animal food full half the year. The method the common people uſe in hunting is with ſnow ſhoes, which are nothing more than a piece of wood half an inch thick, five or ſix feet long, and about four inches broad, turned up at the end, which they faſten at the bottom of their feet, and by means of them they run or rather ſkate over the ſnow, with a pole in their hands, faſter than the hare or any game they purſue, which are apt to ſink in.

They



The Flying Mountains at



at Zarsko Sello .

They enjoy alſo the the profitable diverſion of fiſhing, notwithſtanding the water's being covered with ice; and one manner of it, with a drag-net, is very particular, though I doubt if I ſhall be able to deſcribe it ſo as to give your Lordſhip an idea of it. There is a hole about four feet by two cut in the ice, to let down a common drag-net; oppoſite to this, at the diſtance they mean to pull up the net, is another hole, about four feet ſquare: they then cut a number of ſmall round holes at about four yards diſtance from each in a circular form, from the hole, where the net is let down, to that where it is taken up. At the ends of the two ſtrings, that is the upper and lower ſtrings which drag the net, long poles are tied: theſe poles will reach from one round hole to another, where they are directed and puſhed under the ice, as they ſwim at the top of the water, till they come to the biggeſt ſquare hole, at which they draw them out, and by this means the net, incloſing the fiſh it has ſurrounded; for the upper part of the net is floated at the top of the water under the ice, and the lower part of it ſunk by leads, in the ſame manner as when the river is open: the ingenuity of the opera-

tion conſiſts in the contrivance of dragging under the ice.

Theſe, my Lord, are ſome of the peculiarities of the northern climates in winter; they have their inconveniencies, but they have their advantages too. In ſummer they differ much leſs from ſouthern climates. To balance the long abſence of the ſun in the former ſeaſon, they enjoy a larger ſhare of his influence in the latter; which cauſes vegetation to be exceedingly quick; otherwiſe the ſhortneſs of the ſeaſon would not ſuffice for the neceſſary buſineſs of ſowing the land, for the growth of the corn, and for gathering it in.

Some perſons reckon the light nights in ſummer an agreeable circumſtance, and theſe are very remarkable even in the latitude of St. Peterſbourg, which is 61 degrees: this ariſes not only from the ſun's being ſo ſhort a time under the horizon, but from the ſtrong reflection of the atmoſphere, which cauſes ſo great a brightneſs one may ſee to read and write at midnight, unleſs it be cloudy, for full two months.

I have

I have now finiſhed this account which has nothing of fancy in it to enliven it: it contains merely matters of fact, which could not eſcape my obſervation during a reſidence of eleven years in that country. Indeed, Ruſſia is a country ſo riſing and flouriſhing under the auſpices of the Sovereign who now reigns there, and encourages, in the moſt diſtinguiſhed manner, every endeavour to improve and exalt it, by patronizing all liberal arts and ſciences, that it muſt attract the attention and admiration of mankind in many moſt important points of view. Yet ſtill I flatter myſelf this ſhort relation of the peculiar qualities of its climate may afford ſome reflections not unworthy a philoſophical mind: I therefore preſume to preſent it to your Lordſhip, and ſhall eſteem myſelf very happy if it affords you any entertainment.

I have the honour to be, with the greateſt reſpect,

My Lord,

Your Lordſhip's moſt obliged,

moſt faithful, and moſt obedient

humble ſervant,

Blackheath,
January 22, 1778.

JOHN GLEN KING.

I have now finished this account which has nathing of fancy in it to enliven it: it contains merely matters of fact, which could not escape my observation during a residence of eleven years in that country. Indeed, Russia is a country so rising and flourishing under the auspices of the Sovereign who now reigns there, and encourages, in the most distinguished manner, every endeavour to improve and exalt it, by patronizing all liberal arts and sciences, that it must attract the attention and admiration of mankind in many most important points of view. Yet still I flatter myself this short relation of the peculiar qualities of its climate may afford some reflections not unworthy a philosophical mind: I therefore presume to present it to your Lordship, and shall esteem myself very happy if it affords you any entertainment.

I have the honour to be, with the greatest respect,

My Lord,

Your Lordship's most obliged,

most faithful, and most obedient

humble servant,

JOHN GLEN KING.